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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------------------|-----------------------------|
| 10/725,061 | 12/02/2003 | Kazushi Sato | 245990US6 | 2933 |
| 22850 7590 08/14/2007 OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | EXAMINER GE, YUZHEN | |
| | | | ART UNIT 2624 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|-------------------------------|-----------------------------|--|
| Office Action Summary | Application No. 10/725,061 | Applicant(s) SATO ET AL. | |
| | Examiner Yuzhen Ge | Art Unit 2624 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. Claims 1 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Legall (US Patent 5,761,398).

Regarding claim 1, Legall teaches a method for compensating for motion prediction on each of a plurality of motion compensating blocks formed by dividing an objective frame image of successive frame images by using a plurality of reference frame images while sequentially changing pixel-based sizes of the plurality of motion compensating blocks (col. 1, lines 47-67, col. 2, lines 13-15, lines 39-42, lines 56-65, Fig. 4B, col. 10, lines 28-col. 11, line 5), the method comprising steps of:

a hierarchizing step of thinning out pixels of a motion compensating block having a greatest pixel-based size to be taken as an uppermost layer of among blocks with smaller pixel-based sizes, to generate a size-reduced block in a lower layer having a predetermined size-reduction ratio (Fig. 4B, col. 10, lines 28-col. 11, line 5);

a search range determining step of determining motion vector search ranges respectively within the plurality of reference frame images, on the basis of the size-reduced block and other size-reduced blocks, and a plurality of size-reduced reference images reduced in size corresponding to the size-reduction ratios of the sized-reduced block and other size-reduced blocks respectively (Fig. 4B, col. 10, lines 28-col. 11, line 5); and

a detecting step of detecting an optimal motion vector while sequentially changing the pixel-based sizes of the plurality of motion compensating blocks by using each of the motion

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vector search ranges determined in the search range determining step (Fig. 4B, col. 10, lines 28-col. 11, line 5).

Claim 10 is the corresponding apparatus claim of claim 1. Legall teaches an apparatus (Figs. 1A-1B, 7-7A, col. 8, lines 19-55). Thus Legall teaches claim 10 as evidently explained in the above-cited passages.

Claim Rejections - 35 USC § 102

2. Claims 1-6 and 8-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Butter et al (US Patent 6,549,575 B1).

Regarding claim 1, Butter et al teach a method for compensating for motion prediction on each of a plurality of motion compensating blocks formed by dividing an objective frame image of successive frame images by using a plurality of reference frame images while sequentially changing pixel-based sizes of the plurality of motion compensating blocks (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49), the method comprising steps of:

a hierarchizing step of thinning out pixels of a motion compensating block having a greatest pixel-based size to be taken as an uppermost layer of among blocks with smaller pixel-based sizes, to generate a size-reduced block in a lower layer having a predetermined size-reduction ratio (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49);

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a search range determining step of determining motion vector search ranges respectively within the plurality of reference frame images, on the basis of the size-reduced block and other size-reduced blocks, and a plurality of size-reduced reference images reduced in size corresponding to the size-reduction ratios of the sized-reduced block and other size-reduced blocks respectively (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49); and

a detecting step of detecting an optimal motion vector while sequentially changing the pixel-based sizes of the plurality of motion compensating blocks by using each of the motion vector search ranges determined in the search range determining step (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49).

Claim 10 is the corresponding apparatus claim of claim 1. Butter et al teach an apparatus (Fig. 1). Thus Butter et al teach claim 10 as evidently explained in the above-cited passages.

Regarding claim 2, Butter et al teach a method for compensating for motion prediction according to claim 1, wherein the search range determining step determines the motion vector search ranges depending upon respective differences in pixel-based values from respective of the size-reduced reference images (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49).

Regarding claim 3, Butter et al teach a method for compensating for motion prediction according to claim 2, wherein the search range determining step carries out block matching sequentially on

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the size-reduced reference images with the size-reduced block, so as to determine the search ranges on the basis of an absolute-value sum of a difference between a pixel-based value within the size-reduced block and a pixel-based value within a block corresponding to the size-reduced block within a predetermined size-reduced reference image (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49).

Regarding claim 4, Butter et al teach a method for compensating for motion prediction according to claim 3, wherein the search range determining step determines the search ranges depending upon an absolute-value sum of differences between a pixel value of every other pixel with respect to a horizontal direction and a vertical direction of the size-reduced block and a pixel-based value within a corresponding portion of pixel-based values within the size-reduced block (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49, the absolute difference depends on all the pixel values or the size-reduced block and therefore depends on the absolute-value sum of difference between a pixel value of every other pixel, also every other pixel of a $\frac{1}{4}$ reduced size block is used for evaluating the absolute difference for the $\frac{1}{16}$ reduced size block).

Regarding claim 5, Butter et al teach a method for compensating for motion prediction according to claim 3, wherein the search range determining step determines as one of the motion vector search ranges a peripheral pixel range including an enlarged lower layer motion vector enlarged from a lower layer motion vector between a corresponding portion of pixels where an absolute-value sum of pixel-based values within the size-reduced block is minimum and the size-reduced

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block (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49, 4:1 represents lowest level and 1:1 represents the highest level, enlargement is done because the search range is smaller).

Regarding claim 6. A method for compensating for motion prediction according to claim 1, further comprising: a search range selecting step of selecting only the search ranges within the size-reduced reference images in which a difference of pixel-based values is minimized from the respective size-reduced blocks of among search ranges within the size-reduced reference images determined in the search range determining step, wherein the detecting step further includes detecting an optimal motion vector by using only search ranges within the size-reduced reference images selected in the search range selecting step (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49).

Regarding claim 8, Butter et al teach a method for compensating for motion prediction according to claim 1, wherein the detecting step includes detecting an optimal motion vector based on a Rate Distortion optimization process (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, col. 8, lines 38-49, the minimization of the absolute difference is regarded as the rate distortion optimization process).

Regarding claim 9, Butter et al teach a method for compensating for motion prediction according to claim 1, wherein the detecting step includes sequentially changing the pixel-based sizes of the motion compensating blocks from a greater pixel-based size to a smaller pixel-based size, so as

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to size-reduce the search range each time a change is made (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, the search range is reduced each time a change is made, col. 8, lines 38-49).

Claim Rejections - 35 USC § 103

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Butter et al in view of Sullivan et al ("Rate-Distortion Optimization for Video Compression", Gary J. Sullivan et al, IEEE Signal Processing Magazine, November 1998, pp. 74-90, cited by IDS).

Regarding claim 7, Butter et al teach a method for compensating for motion prediction according to claim 1, wherein: the detecting step includes detecting the optimal motion vector depending on respective differences in pixel-based values between the size-reduced blocks and the size-reduced reference images (Figs. 5-8, col. 6, lines 3-23, col. 6, line 57-col. 7, line 10, col. 7, lines 13-34, the search range is reduced each time a change is made, col. 8, lines 38-49). However they do not explicitly teach detecting the optimal motion vector depending on a quantizing scale function and a generation code amount for the motion vector differences. In the same field of endeavor, Sullivan et al teach detecting the optimal motion vector depending on a quantizing scale function and a generation code amount for the motion vector differences (left column of Page 82, equation (9), left column of Page 84, equation (11), Page 86). It is desirable to increase the overall performance of a video codec (bottom two paragraphs of left column of Pages 80 and 81, middle paragraph of right column of Page 81). Therefore it would have been obvious to one of ordinary skill in the art, at the time of invention, to use the method of Sullivan et al to detect

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the optimal motion vector also depending on a quantizing scale function and a generation code amount for the motion vector difference in the method of Butter et al so that the overall performance of a codec can be improved.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US Patent 6,968,009 B1 by Straasheijm.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yuzhen Ge whose telephone number is 571-272 7636. The examiner can normally be reached on 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

WENPENG CHEN
PRIMARY EXAMINER

Yuzhen Ge
Examiner
Art Unit 2624


6/21/07